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~(252)Cf中子活化核燃料棒~(235)U富集度均匀性检测装置

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摘要 采用²⁵²Cf中子活化方法研制燃料棒²³⁵U富集度均匀性检测设备,用慢化后的²⁵²Cf中子照射燃料棒,使燃料棒UO₂芯块中的²³⁵U发生裂变,通过测量其裂变产物的γ射线总强度对燃料棒²³⁵U富集度及其均匀性进行在线检测。采用1.2mg的²⁵²Cf中子源,能检测出燃料棒中²³⁵U富集度相对偏差±10%的单个混料芯块,单根燃料棒的检测速度可达7m/min,检测结果的置信概率为97.74%。

关键词 [燃料棒](#) [中子活化](#) [²³⁵U富集度均匀性](#) [²⁵²Cf中子源](#)

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Fuel Rod ~ (235)U Enrichment Uniformity Scanner With ~ (252)Cf Neutron Activation Method

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Abstract The developed scanner for scanning fuel rod ²³⁵ U enrichment uniformity is based on the ²⁵² Cf neutron activation method, in which the delay gamma rays emitted by fission products from ²³⁵ U fission induced by moderated ²⁵² Cf neutrons are counted along the fuel rod moved successively through the irradiator containing ²⁵² Cf neutron sources and the BGO crystal detectors at a constant speed by a mechanical conveyor. The present equipment has two channels for inspecting two fuel at the same time. When a ²⁵² Cf source of 1.2 mg is used, the single off spec pellet which deviates from normal enrichment by ±10% can be detected at the scanning speed of 7 m/min with 97.74% confidence.

Key words [fuel rod](#) [neutron activation](#) [~\(235\)U enrichment uniformity](#) [~\(252\)Cf neutron source](#)

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